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THE IMPACT OF ORGANIZATION SIZE AND TECHNOLOGY ON MANAGERIAL CO--ETC(U)
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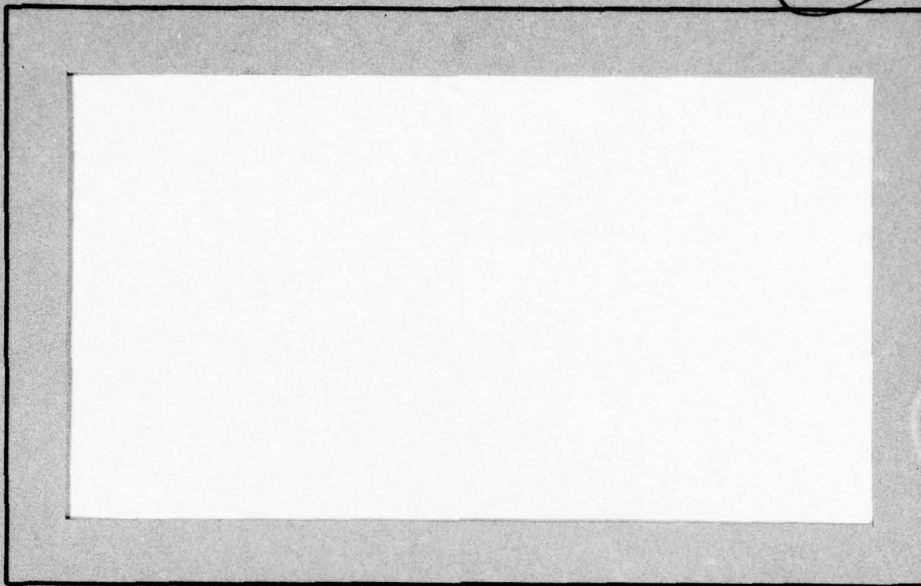
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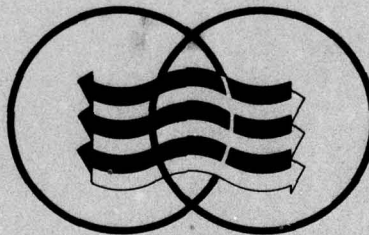
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THE MAXWELL SCHOOL OF CITIZENSHIP AND PUBLIC AFFAIRS ✓
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② THE IMPACT OF ORGANIZATION SIZE AND TECHNOLOGY
ON MANAGERIAL COMMUNICATION STYLE, ITS CREDIBILITY
AND CONSEQUENCES.

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⑩ Rudi/Klauss, Bernard/Bass,
Syracuse University SUNY - Binghamton
John J./DeMarco
Syracuse University

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Size (measured at 3 levels) and technology (measured at 2 levels) were related to 13 variables in a communication model. The results suggested that both technology and size influence managerial communication behavior and in turn colleague outcomes. In particular, managers in the traditional technology organization were generally rated more highly on dimensions of communication style. The most critical size measure related to communication behavior was the number of people reporting to the focal manager. As the number of subordinates reporting to a focal manager increased, effective managerial communication appeared to decrease. More macro measures of size (department/division size) appeared to have little impact on a manager's communication style, credibility and colleague consequences.

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ABSTRACT

This research examines the impact of size and technology on managerial communication behavior in two organizational settings. Data was collected from managers and their colleagues from two major companies within a large diversified corporation. One company is characterized by a traditional, stable technology while the other employs a technology which is relatively more sophisticated and modern in nature.

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Introduction

Current research in the field of organizational behavior reveals considerable confusion and uncertainty regarding key variables associated with communication behavior such as technology, structure, and organization size. Separately, each of these variables has been found to be of considerable importance in particular studies. However, potential linkages among these and related variables are yet to be clearly established.

In the exploratory research reported below we will consider some of these linkages particularly those involving technology, size and communication behavior.

Technology and Organizational Communication

The significance of technology as a central and defining characteristic of organizations has been quite amply documented (Woodward, 1965; Lawrence & Lorsch, 1967; Aldrich, 1972; Comstock and Scott, 1977), even though there is still some debate as to the relative importance of this variable in contrast to organization size (Hickson, Pugh & Pheysey, 1969; Mohr, 1972).

The question of level. One issue surrounding the technology question is the level at which organization technology is (or should be) measured or classified. Previous research tends to place entire organizations into one category or another for purposes of analysis (Woodward, 1965), although other research suggests that such macro-level categorizations may make unrealistic assumptions of homogeneity between departmental units and subunits (horizontally and

and vertically) within the larger organization being categorized.

At least three organizational levels can be considered when applying the concept of technology: individual worker; subunit or departmental unit; larger organization (Comstock and Scott, 1977). Thus, for example, higher level units within a larger R&D basic research organization may be involved primarily in planning technological developments, while at the lower levels technical aspects of testing specific applications may be the primary activity. Alternatively, we may find accountants working on rather routine financial matters in the finance unit within the R&D organization while engineers and scientists make up the bulk of the organization. In such a situation we might be particularly interested in learning the extent to which the accounting function is of consequence compared to the basic overriding technological thrust of the organization in influencing organizational communication and behavior across subunits regardless of the immediate task of the particular group.

Individual positions. Up to now there has been relatively little research to help us understand these potential effects of technology on organizational communication. Yet we are aware that those working in different functions tend to receive different amounts of information. Thus, Davis (1953) has found that staff managers were generally more informed about company events than line managers. Again, one's function determines what sources of information will be salient. For example, Holland (1972) noted that scientists in R&D organizations depended considerably on communication and information from profes-

sional colleagues outside their own organization. These findings suggest that the particular mode of operation, specific task, or way of doing one's job (R&D scientist, accountant, or purchasing agent, etc.) is likely to increase certain kinds of communication behaviors and interactions and decrease others.

The kind of education and training one has received in preparation for specific kinds of jobs and professions are obviously likely to influence communication behavior and what information can be and will be processed (Mason & Mitroff, 1973; Dearborn & Simon, 1958; McKenney, 1971). Furthermore, even within functional and disciplinary areas, different personal characteristics (depending on status, motivation for upward mobility, etc.) may influence communication interaction. In short, macro level categorizations of organizations by technology type get only a portion of the picture; intraorganizational factors also deserve attention.

Size and Communication

The relative importance of size as a key variable in gaining an understanding of organizations has been considered in a number of studies. Reviewing the literature from 1950-1974, Kimberly (1976) identified some 80 empirical studies in which the relationship of size to organization structure was a central focus. He found that there has been very little theoretical development of the concept of size in relation to structure and that adequate conceptual definitions of size are largely lacking in the literature.

While Kimberly's review focused particularly on relationships to

structure, other research has documented the importance of size as a variable for consideration in relation to communication behavior. For example, Thomas and Fink (1963) concluded on the basis of 31 empirical studies (mostly laboratory research) that group size significantly affects aspects of individual and group performance, member satisfaction, the nature of interaction, and the distribution of participation of group members. Subsequent field research provides support for these conclusions. Blau (1968) found that the ratio of operating personnel to managers in an organization had an impact on upward communication opportunities and communication feedback. Other field research suggests that as work group size increases, there is a corresponding increase in lateral communication and decrease in face to face interaction (Roberts and O'Reilly, 1974).

In many instances, the level of analysis of primary concern in examining the relationship of size to individual communication behavior would be the workgroup. However, other size considerations (number and size of departments as well as total organization size) might also influence the intensity and direction of flow. The relative importance and interactions between these levels of analysis has not been systematically examined. This point is confirmed by Porter and Lawler (1965, p. 39) who have noted that:

"Investigators have failed to control for variation in size of the other types of subunits (primary workgroups, department, large organization) of which the individual is a member while they are studying the

effects of size on one type of unit."

Hence, as with technology, the level of analysis issue needs to be further examined when considering size in relation to other organizational variables.

Purpose. In the research reported below we will examine the extent to which some of these technology and size issues can be differentiated across level (departmental, subunit, and individual) and are related to communication between managers and their colleagues. In particular, we are concerned here with exploring the following questions: 1) to what extent does the basic function of the overall organization (as defined in terms of product, overriding technology and market environment) influence managerial interpersonal communication behavior; 2) to what extent does the specific technical function of managers in their particular subunits appear to influence managerial communication behavior; 3) to what extent does size (department and subunit), separately and interactively with technology appear to influence managerial communication behavior.

METHOD

Sample

The data used in the study reported here were collected from two sets of managers and their colleagues within two major subsidiaries of a large, diversified corporation. The two subsidiaries differ considerably in their product and technology. One, "Oldline", employs a traditional stable technology and turns out a product that has seen relatively little modification of any extreme or dramatic

sort in the last several decades. It manufactures a standard, heavy duty piece of equipment that has a fairly, predictable demand in a market condition where competition generally is not marked or influenced by large shifts or developments of a technological nature. "Avtech", on the other hand, is concerned with sophisticated, precision oriented technology and product which is continually evolving. It operates in a market environment which is relatively dynamic and somewhat unpredictable.

The procedure for collecting data was the same in both companies. Communication Audit questionnaires were distributed to a total of 114 managers attending short management training seminars. They completed their questionnaires in terms of how they saw themselves as communicators as well as other aspects of their work situation. Each manager (hereafter referred to as the focal person) was also asked to distribute up to 10 questionnaires to colleagues (subordinates, peers, and superiors) who knew the focal person well enough to describe him or her along the same dimensions. Practical considerations in data collection dictated that the specific colleagues included in the sample be chosen by the focal person rather than the usual random or total questionnaire approach. Randomized sampling procedures, while being reproducible, might have included colleagues who really did not know the focal persons well enough to rate them accurately. Also, response rates, typically, would have been lower.

It should be pointed out that for most middle managers, 10 col-

leagues normally constitute most if not all the number of persons who know them well enough to rate them. If focal persons distributed only one or two questionnaires we would expect a strong bias and restriction. If the mean number distributed is close to 10, then at least we can be quite confident that the focal persons were not a source of restriction of sample. In this particular study, 967 colleagues completed questionnaires on the 114 focal persons. While an accurate count of the return rate for colleagues is not possible since some focal persons may not have handed out all 10 colleague questionnaires included in their packets, the above figures indicate a minimum of an 87% response rate for colleagues. This is in contrast to the many surveys with 20 or 30 percent response rates.

Although anonymous, the questionnaires were coded so that colleagues could be linked to each focal person. Completed instruments were sent through interoffice mail to a central collection point, and then sent in a batch to an external computer center for analysis. Separate, individualized computer printouts were produced and returned to each participating focal person which allowed the participant to compare his own self score on various dimensions with the average response of his colleagues on those same dimensions. This mirror mechanism thus provided feedback on how others saw him and the work situation as compared with his own perceptions.

Technology Assessment

As indicated earlier, at a macro, organizational level we characterized Oldline as a "traditional" stable technology organization

operating in a stable, predictable market environment as compared to Avtech. This characterization is based on descriptive material provided by the corporation and subsequent discussions with corporate officials which led to the judgement that this distinction roughly captured the basic overriding difference between the two companies.

It is noted, at this point, that the two companies differ in terms of overall size as measured by number of full time employees and that this difference is a potential confounding influence when attempting to investigate the interrelationships among the various size and technology variables. The question is: what is it about Oldline versus Avtech that makes a difference of consequence? Is it the distinction between the technical thrusts of the organizations or is it their differences in size, or both? The literature on organizational size suggests that in the size range of the two companies being examined, the effects of total size are small. In other words, while a difference in organizational size between a firm having 200 full time employees and another with 4000 employees has substantial implications for numerous aspects of the respective organizations' structures and processes, a difference between 2900 (Avtech) and 4800 (Oldline), the observed difference here, has a minimal effect--both organizations, Oldline and Avtech, can be considered "large." Blau and Schoenher (1971) reported that formalization of personnel procedures, hierarchical differentiation, horizontal differentiation, number of sections per division, span of control, and the admini-

strative ratio, increase "with increasing agency size quite rapidly at first but taper off for agencies with more than 1000 employees". These findings are supported by the work of Hall, Haas, and Johnson (1967). This is not to say that huge differences in size at the 1000 plus level are not significant, say from 2000 employees to 10,000, but it is argued that the primary difference between the two "large" organizations considered here concerns their technology and product. Thus, we found no significant differences in the sizes of Oldline's and Avtech's departments and workgroups. They also had a fairly similar distribution of personnel across functions except for production.

As a more immediate measure of technology, data was collected concerning the primary functions of the focal persons' particular departments or divisions (e.g. engineering, accounting, marketing, etc.). This information was interpreted in terms of the technology demands such functions placed on the focal person at that level. Unfortunately, differences in specific task assignments of individual focal persons and colleagues within particular departments was not available.

Size

Beyond the Oldline-Avtech difference in overall size, three other measures of size were obtained for each focal person: the size of his department or division; the size of his own workgroup (the group in which the focal person and others at his same level report to the same superior); the number of people reporting directly to the focal

person.

Assessment of Communications, Style, Credibility and Consequences

These measures were derived from colleagues' ratings of the focal person on 13 scales incorporated into a communication model underlying the larger research effort of which this present study is part. (See Figure 1). The model identifies six behavioral dimensions of a manager's interpersonal communication style: careful presentation of ideas; open and two way communication; frankness; careful listening; brevity; informality. These six factors are seen to influence a focal manager's colleagues' sense of role clarity and their perceptions of the manager's credibility. Role clarity and credibility in turn are seen to affect colleagues in terms of their role satisfaction, satisfaction with focal person, and effectiveness. For further discussion of the theoretical and empirical background concerning the original model and the properties of the 13 variables identified in it the reader is referred to previous technical reports (Klauss, 1976 a, b).

INSERT FIGURE 1 ABOUT HERE

It should be noted that in the results reported below the average score across colleagues for a given focal person was calculated initially and then utilized in the statistical tests.

Analyses

The primary objective was to explore the relationships between technology, size and communication behavior. Our aim was to test

the extent to which size and technology had relevance to the general research model referred to earlier.

Incorporating the size variables into the communication model presented no methodological difficulties, as the variables were measured on an interval scale (actual number of individuals in the focal person's work group, department, etc.). However, technology was a categorical dichotomy. Oldline's traditional technology contrasted with Avtech's modern technology. Focal persons were located in different departments or divisions engaged in the functions of production, purchasing, research and development, sales, marketing, advertising or public relations, engineering design, client service, finance/accounting, personnel training, or other. These nominal measures could not be directly entered into the path regression model of the 13 communication variables. To overcome this methodological problem, the categorical measure of organizational technology was scored as 0 or 1 (traditional technology = 0) (modern technology = 1). The measures of primary function were subjected to nominal decomposition (Lyons, 1971). A dummy variable was created for each functional category and the focal person was assigned a "1" if he identified it as the primary function of his department or division and an "0" if he did not (the categories "general administration" and "other" were omitted due to a small N in the case of the former and lack of explanatory value in the latter. This made it possible to correlate technology with the 13 communication variables and size at two levels, organizational and departmental.

Results

Table 1 displays the intercorrelations among the 13 variables in the formal communication model (Figure 1) for the total sample. As can be seen, satisfaction with focal person, and effectiveness have the strongest correlations with the communication style variables, credibility and role clarity. Intercorrelations among the six styles are quite low.

Table 2 shows the intercorrelations among size, technology, age and education variables. Larger work groups were found in larger departments. The span of control also increased as these units increased in size. Larger units existed in production and engineering.

Technology and Communication

Table 3 shows how organizational and biographical variables differed between Oldline and Avtech.¹ As can be seen from this table, the sample of employees in Oldline was slightly older, had a few more years of service in the company, and had slightly more formal education. Although these particular biographical differences were statistically significant, their absolute differences seemed of little practical import.

Most important for us, the size of departments and workgroups as well as the distribution of personnel across functions was similar in both companies. This supports our argument that the major difference between the companies was their different technology.

INSERT TABLE 1, 2, 3, & 4 ABOUT HERE

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INSERT TABLE 1, 2, 3, & 4 ABOUT HERE

Table 4 displays the mean scores of focal managers in the two companies on measures of focal manager communication style, credibility, and effects according to their colleagues. Oldline managers received more favorable ratings overall. In particular, they were rated significantly higher as careful transmitters and as being open and two-way in their communication style. Subordinate role clarity and effectiveness ratings were also higher in Oldline.

The results for role clarity were seen to support the view that traditional technology is likely to be more certain, less complex and therefore likely to permit relatively permanent and stable role responsibilities. On the other hand, Avtech with its modern technology was more likely to remain in a state of flux. It was required to be responsive to changing products and technical innovations, and as a consequence was in a situation where roles would be less clear. Avtech's need for more effective managerial communication behavior is probably due to the fact that in Oldline job definition and role responsibilities are provided to a considerable extent by the job itself and less so by colleagues in the immediate work setting.

The correlations between organizational technology and the 13 variables the communication model reported in table 5 are consistent with what was noted in table 4. That is, traditional compared to modern organizational technology appeared to be related to being a careful transmitter, open and two way as well as to colleague role clarity, role satisfaction and effectiveness.

At the next level down of technical differentiation (depart-

mental functional categories) engagement in production, purchasing, and sales related significantly to communication patterns.² Production managers (the majority of who came from the modern technology company) were rated relatively low in terms of being careful transmitters, open and two way, trustworthy, informative and effective. Satisfaction with focal persons in production was also low. Purchasing managers were likely to be seen as trustworthy and dynamic; and colleagues were generally satisfied with them as focal persons. Sales managers were more often seen as failing to be brief and concise, but their colleagues felt their own roles were clear. Colleagues in client services, on the other hand reported lower role clarity than average for all functional groups.

Size and Communication

Among the three measures of size, the number of people reporting directly to the focal manager yielded several significant negative correlations. That is, an increase in the number of people reporting to a manager was negatively associated with being seen as a careful transmitter, open and two way, a careful listener, brief and concise, trustworthy, and informative. Satisfaction with focal person and effectiveness also dropped as size increased. The only exception to this negative trend was with colleague's role satisfaction which was positively associated with increasing size. At the departmental level, size was negatively associated with open and two way communication and trustworthiness.

These above patterns suggest that the most direct and immedi-

ate size effect is at the focal manager--subordinate level. As the number of subordinates reporting to a manager increases, the focal manager is seen to be less effective in his communication style, and sense of satisfaction with the focal person effectiveness deteriorates. These results are consistent with previous research (Thomas & Fink, 1963; Blau, 1968; Roberts & O'Reilly, 1974) where size has been seen to affect aspects of interpersonal communication, individual and group performance as well as individual satisfaction on the job.

Impact of Technology and Size on the Communication Model

To summarize how all the variables discussed above interacted with each other, and, to see how well the formal model could describe the linkages, a path analysis was performed.³ The size and technology variables were posited as prior constraints which, in turn, influenced managerial communication style, credibility, colleague role clarity, and consequences. In addition to the size and technology variables, the focal person's age and education level were also entered as prior constraints into the path analysis in light of the differences observed between the two companies on these variables (see table 3) and based on the potential importance of these variables to communication behavior as suggested by Mason and Mitroff (1973). These procedures, thus permitted a determination of the extent to which those factors independently influence communication style, credibility, role clarity, and consequences.

In performing the path analysis, paths having coefficients less than .15 were eliminated from the model and the remaining coefficients were recalculated.

As seen in Figure 2, organizational technology (traditional versus modern) was negatively linked to the tendency to be open and two way in communication, frank, and careful as a transmitter and listener. This would suggest that as we move from traditional to modern technology in our two samples that managers are rated less highly in these areas of communication behavior. Production and sales also emerge as negative predictors of open and two way communication and brevity respectively. These relationships held while controlling for basic technology of the organization, indicating that for certain functional areas the specific function performed by the manager "overrides" the larger organization function.

Work group size positively affects brevity and number of persons reporting to focal person negatively influences two way communication, brevity and careful transmission. Hence the more immediate size consideration seems to play the most important role in influencing a manager's communication style.

Among the intervening variables, role clarity is negatively influenced by brevity, informality, and careful transmission. Trustworthiness is influenced by all but two of the six communication style dimensions (brevity and open and two way), while in-

formativeness appears to be best predicted by careful listening and frankness. Dynamism is influenced positively by frankness and negatively by careful listening.

We note that no linkages are apparent between open and two way communication and role clarity and credibility variables. In previous analyses (Klauss, 1977; Klauss, Bass, and DeMarco, 1977) the open and two way communication measure appeared to be a very weak predictor of role clarity only, and, the path coefficient just barely reached statistical significance. Since this analysis employs a subset of the initial sample (only those managers in Oldline and Avtech), it is not surprising that this linkage is not supported empirically.

Finally, we find that among the three colleague consequences that satisfaction with focal person is best explained by the model ($R^2 = .74$), followed by effectiveness ($R^2 = .55$), and general role satisfaction ($R^2 = .18$). These findings are consistent with results obtained in earlier studies (Klauss, Bass, and DeMarco, 1977; Bass, Klauss and DeMarco, 1977). Thus communication behavior appears to more directly relate to satisfaction with the communicator and perceptions of his work effectiveness as compared to a colleagues' own sense of overall role satisfaction in his own work.

Implications

While this research does not provide conclusive evidence concerning the relationships between organizational technology, organi-

zational size dimensions, and interpersonal communications, the findings suggest important implications for the study of interpersonal communication behavior in organizations. Among other things, our results clearly suggest that both technology and size are of importance in understanding communication behavior.

The overall technical function of the organization appears to have a significant independent effect on the communication styles of managers, and at the same time the specific technology or function of a manager may in some cases also impact his communication style, independent of the basic production function of the organization. While only a few of the functions measuring immediate technology revealed significant patterns this may be explained in part by the fact that these variables were at best rough approximates in measuring the more immediate level technology in which these managers were engaged. In subsequent research we hope to obtain better measures of technology at the work level so that this variable can be examined more closely in relation to communication behavior.

In general terms, it might be concluded that effective communication is more difficult to achieve in high technology settings (as compared to traditional technology organizations) since the nature of the work is relatively less predictable and routine and since expertise is likely to be more widely disbursed. Hence communication skills training would be particularly important in high technology organizations.

Apart from technology, it also is evident that size does affect a manager's communication style. Overall size of organization may not be a critical factor among "large" organizations but at a more immediate work unit level as the number of people reporting to a manager increases, he clearly has less time to communicate with each subordinate and with others around him. This in turn can also affect colleague satisfaction and perceptions of effectiveness. Hence, the message from an organization design perspective is quite compelling: keep the number of people reporting to a common superior reasonably small. This would appear to be especially true for high technology situations where the nature of the work may well require greater interpersonal communication.

FIGURE 1

MODEL REPRESENTING IMPACT OF FOCAL MANAGER'S INTERPERSONAL
COMMUNICATION STYLE ON COLLEAGUES

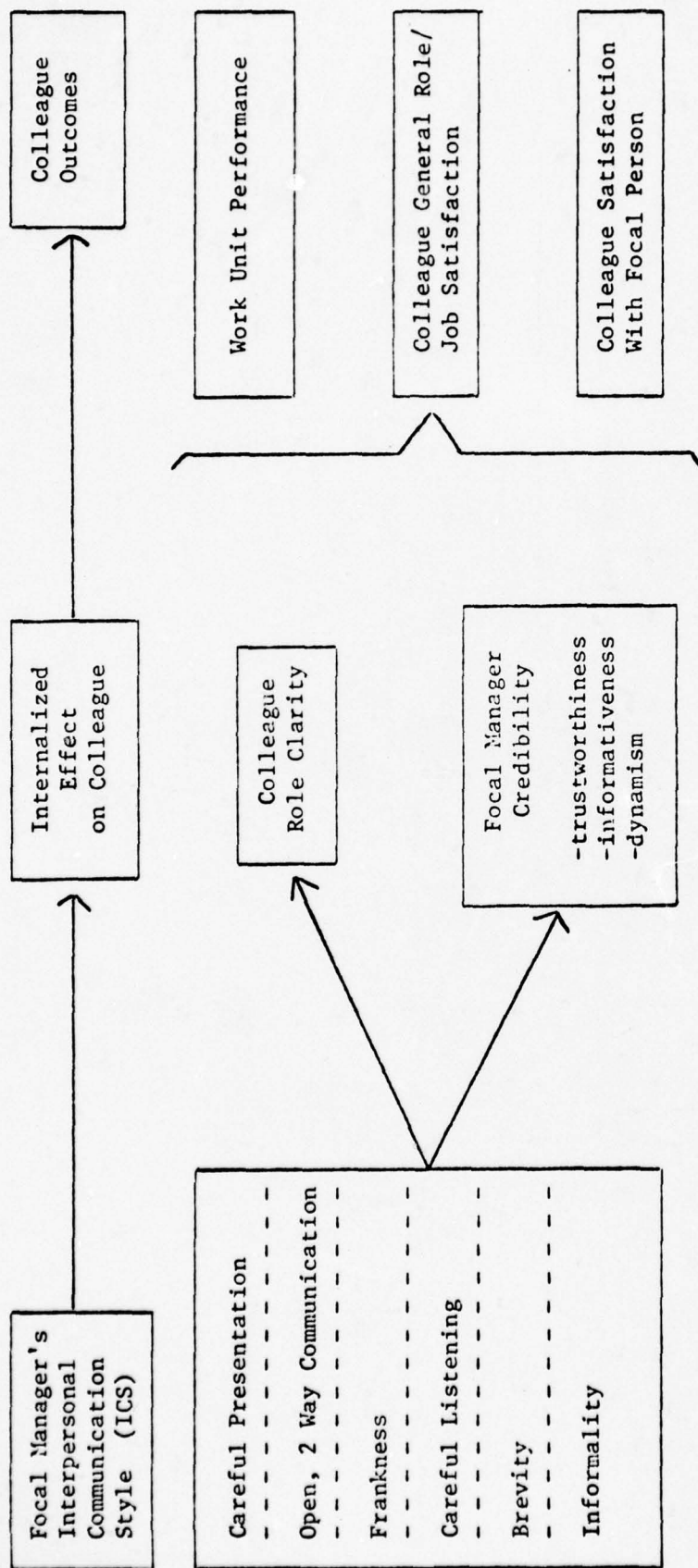


TABLE 1

CORRELATION MATRIX: INTERCORRELATIONS OF FOCAL MANAGER
 COMMUNICATION STYLE, CREDIBILITY, COLLEAGUE ROLE CLARITY AND CONSEQUENCES

COMMUNICATION STYLE	Careful Transmitter	Open and Two Way	Frank	Careful Listener	Brief & Concise	Informal	Role Clarity	Trustworthy	Informative	Dynamic	Satisfaction With Focal Person	Role Satisfaction	Effectiveness
Careful Transmitter													
Open and Two Way	.39												
Frank	.30	.32											
Careful Listener	.41	.43	.11										
Brief and Concise	.38	.31	.14	.53									
Informal	.20	.36	.19	.38	.26								
INTERVENING VARIABLES													
Role Clarity	.14	.15	.14	.11	.06	.19							
Trustworthy	.34	.38	.07	.50	.32	.43	.20						
Informative	.30	.26	.47	.21	.22	.12	.19	.22					
Dynamic	.18	.20	.57	-.02	.01	.10	.10	.01	.40				
CONSEQUENCES													
Satisfaction with Focal Person	.43	.48	.35	.51	.44	.36	.24	.47	.45	.03			
Role Satisfaction	.13	.05	.07	.00	.03	-.01	.22	-.03	.06	.56	.03		
Effectiveness	.42	.45	.36	.37	.35	.27	.30	.31	.40	-.06	.56	.15	

(N = 114; coefficients greater than .14 are significant at the .05 level)

TABLE 2

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CORRELATION MATRIX: INTERCORRELATIONS OF SIZE, TECHNOLOGY, AND AGE/EDUCATION VARIABLES

	Department Size	Work Group Size	No. of People Reporting	Modern vs Traditional	Production**	Purchasing	Research and Development	Sales	Engineering	Client Services	Fin/Acct	Per Training	Focal Manager's Age	Focal Manager's Education
Department Size	-													
Work Group Size	.25	-												
No. of People Reporting	.35	.25	-											
Modern vs. Traditional	.12	-.17	-.04	-										
Production**	.34	.06	.23	.30	-									
Purchasing	-.16	-.07	-.27	.17	-.13	-								
Research and Development	-.01	-.01	.11	-.04	-.10	-.10	-							
Sales**	-.06	-.03	-.07	-.16	-.12	-.11	-.09	-						
Engineering	.33	.19	.21	-.04	-.14	-.13	-.11	-.12	-					
Client Service	-.06	.09	.00	.12	-.05	-.04	-.03	-.04	-.05	-				
Fin/Acct	.06	.03	-.03	-.01	-.11	-.11	-.09	-.10	-.12	-.04	-			
Per Training	-.13	-.05	.04	-.05	-.08	-.07	-.06	-.07	-.08	-.02	-.06	-		
Focal Manager's Age	-.07	-.06	.03	-.34	-.02	.07	-.03	.19	-.16	-.13	-.10	-.03	-	
Focal Manager's Education	.08	.14	.02	-.13	-.16	-.23	.15	-.12	.24	-.04	.12	.07	-.21	-

(N = 105; coefficients greater than .14 are significant at the .05 level)

* 0 = Oldline Company, "traditional" technology; 1 = Avtech Company, "modern" technology

** The variables were coded dichotomously, e.g., 0 = nonproduction, 1 = production.

TABLE 3
SUMMARY PROFILE OF BIOGRAPHICAL VARIABLES, ORGANIZATION
SIZE MEASURES AND TECHNOLOGY

PART A: BIOGRAPHICAL VARIABLES

VARIABLE	Oldline ** (N = 54)	MEDIAN *** Avtech (N=60)	U	N	Probability
Focal Person's Years of Service	4.5 (12 years)	3.5 (7 years)	1225.5	-2.27	.02
Focal Person's Age	5.4 (44 years)	4.1 (37 years)	889.5	-4.21	.00
Focal Person's Education	10.2 (4 yr. degree +)	9.4 (3 yrs. college +)	1332.0	-1.65	.09
Median Age of Focal Person's Colleague Group	5.2 (43 years)	4.2 (38 years)	660.0	-5.45	.00
Median Education of Focal Person's Colleague Group	9.2 (3 yrs. college +)	8.8 (2 yrs. college +)	1248.0	-2.11	.03
Focal's Response: Levels below you in this organi- zation	4.8	4.1	906.5	-1.13	.25

* Differences between the two companies were assessed by the statistical technique appropriate to the level of measurement. Interval scales were subjected to a standard difference of means t-test. Ordinal scales were subjected to a difference in medians Mann-Whitney U test. Nominal measures were evaluated with a difference in proportions test. See Appendix A for specific biographical items.

** NOTE: Oldline = traditional technology organization; Avtech = modern technology

*** Medium scores from items were used in the analysis. Response choices to some items were in terms of 4-5 year blocks of time (see Appendix A). For these items, approximate equivalent values in years are provided for ease of interpretation.

TABLE 3 (continued)

PART B: SIZE

VARIABLE

	MEAN		t value	SD	
	Oldline	Avtech		Oldline	Avtech
Focal's Response: Number of People in your Department	38.8	49.1	-1.56	34.3	35.8
Focal's Response: Number of Persons in Your Work Group	23.7	15.7	1.49	31.2	26.1
Focal's Response: Number of People Reporting to You	2.2 (8 persons)	2.1 (5 persons)	U 1431.0	N -.48	Probability .63

TABLE 3 (continued)

PART C: TECHNOLOGY

Focal Person's Department Function	Percentages		Z	Probability
	Oldline	Avtech		
Production	2%	22%	-3.46	.00
Purchasing	6%	17%	-1.84	.07
Research & Development	10%	7%	.55	.58
Sales	16%	5%	1.85	.07
Engineering	16%	12%	.59	.56
Client Servicing	0%	3%	1.34	.19
General Administration	0%	0%	0	1.0
Finance/Accounting	10%	9%	.17	.87
Personnel	6%	3%	.74	.46
Other	34%	21%	1.51	.14

TABLE 4

Means of Average Colleague Group Scores of Focal Persons'
Communication Styles, Credibility, Role Clarity and Conse-
quences and Their Differences Between Companies

Variable	Mean		t Value	SD	
	Oldline (N=54)	Avtech (N=60)		Oldline	Avtech
Communication Style					
Careful transmitter	6.2	5.6	3.44**	.74	.84
Open and Two way	5.9	3.4	3.84**	.63	.67
Frank	6.7	6.1	1.48	.85	.73
Careful listener	6.9	6.8	.71	.70	.76
Brief & concise	7.2	7.0	.58	.72	.97
Informal	6.2	6.3	-.22	.86	.95
Intervening Variables					
Trustworthy	6.8	6.7	.76	.63	.82
Informative	7.1	6.9	1.07	.72	.74
Dynamic	6.9	6.9	.01	.88	.69
Role clarity	7.0	6.7	3.04**	.46	.52
Consequences					
Satisfaction with focal person	5.9	5.7	1.36	.78	.85
Role satisfaction	5.5	5.3	1.72	.61	.74
Effectiveness	4.9	4.3	5.20**	.58	.57

** p < .01

TABLE 5
CORRELATION MATRIX: SIZE, TECHNOLOGY, AND COLLEAGUE SCORES OF FOCAL MANAGER
COMMUNICATION STYLE, CREDIBILITY, COLLEAGUE ROLE CLARITY AND CONSEQUENCES

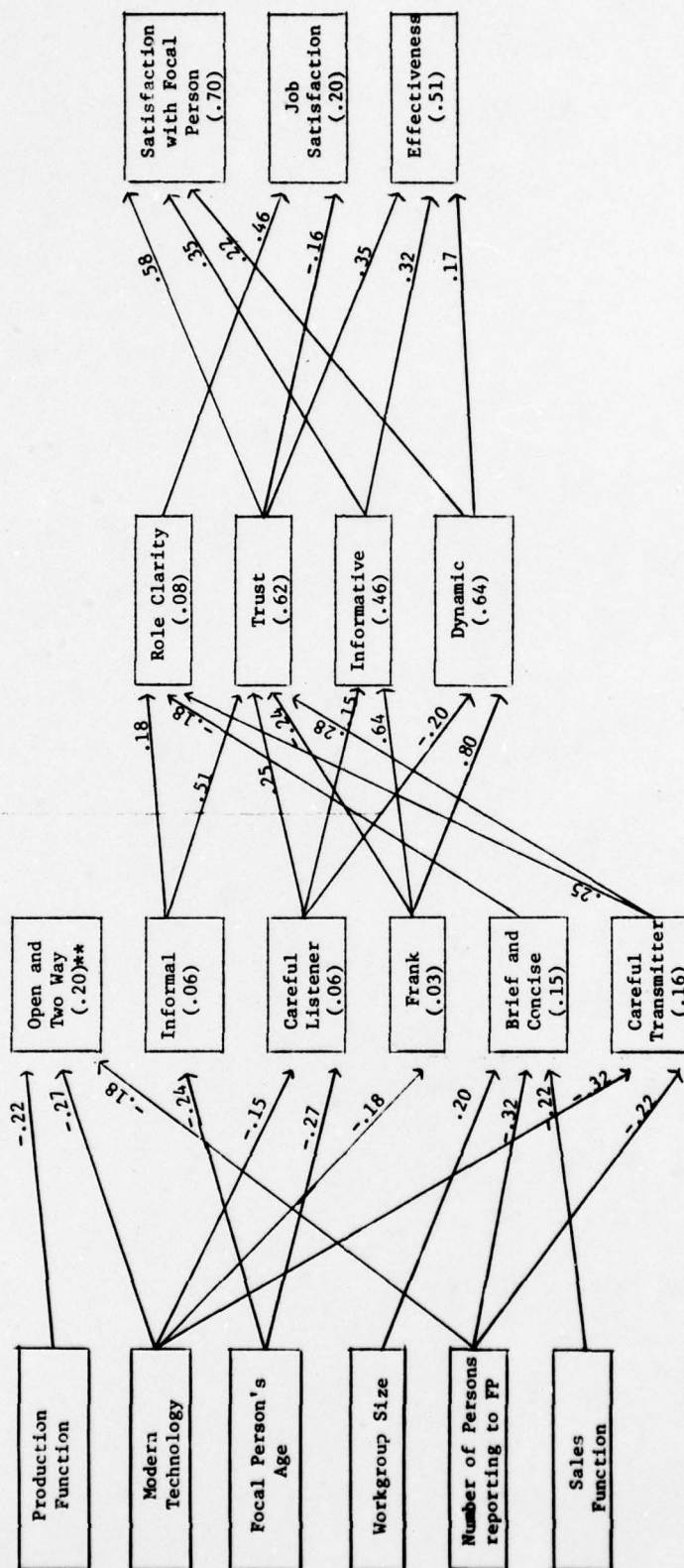
	Dept. Size	Work Group Size	No. of People Report- ing	Modern vs. Traditional	Product- ion**	Purchas- ing	Research & Development	Sales	Engineer- ing	Clinet Service	Fin/ Acct	Per Training
<u>Communication Style</u>												
Careful Transmitter	-.10	-.05	-.22	-.30	-.19	.05	.05	.00	.00	.06	-.09	.05
Open and Two Way	-.16	-.05	-.22	-.34	-.34	.12	.08	-.02	.00	-.07	.01	.03
Frank	.02	-.08	-.07	-.13	-.11	.04	.06	-.08	-.01	-.12	-.07	-.04
Careful Listener	-.13	.07	-.16	-.06	-.12	.04	.12	-.09	.04	.05	-.06	.09
Brief and Concise	-.08	.09	-.24	-.05	-.02	.00	.08	.20	-.05	.12	-.04	-.02
Informal	.00	.00	.00	.02	-.12	.06	.11	-.11	.05	.09	-.02	.02
<u>Intervening Variables</u>												
Role Clarity	-.13	.08	-.01	-.27	-.12	.06	-.13	.20	-.03	-.16	.07	-.09
Trustworthy	-.15	.00	-.26	-.07	-.16	.17	.04	-.03	-.06	-.10	.00	.10
Informative	-.10	.01	-.16	-.10	-.23	.06	.08	-.10	-.04	-.11	.00	.03
Dynamic	.00	-.08	-.03	.00	-.06	.18	-.04	-.04	-.04	-.07	-.05	-.03
<u>Consequences</u>												
Satisfaction with Focal Person	-.12	-.01	-.29	-.12	-.24	.16	.03	-.13	.00	.00	.02	-.01
Role Satisfaction	-.03	.06	.22	-.16	.01	-.06	-.06	.00	.02	-.05	-.02	.12
Effectiveness	-.13	.06	-.20	-.44	-.30	.10	.12	-.08	.05	-.11	-.03	-.02

(N = 114; coefficients greater than .14 are significant at the .05 level)

* The technology variables were coded dichotomously, e.g., 0=traditional technology, 1= modern technology;
0=nonproduction, 1= production; etc.

FIGURE 2

PATH ANALYSIS: SIZE, TECHNOLOGY, AND COMMUNICATION BEHAVIOR*



*(Sample = 98 focal managers. All path coefficients shown here are significant at the .05 level).

**The number in parentheses within boxes are the obtained R^2 values.

Footnotes

¹Since the items in this section of the questionnaire sometimes yielded responses which were not interval, median and proportions tests of differences were utilized where t-tests were inappropriate. See Appendix A for specific items in the biographical section of the survey instrument.

²As noted earlier, dummy variables for each of the eight departments made it possible to treat departmental differences in function as sources of variance. Table 5 shows the resulting intercorrelation matrix.

³For a discussion of the validity of employing path analytic techniques on the types of measures included in this analysis, see Appendix B.

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APPENDIX A

PART A: BIOGRAPHICAL INFORMATION

To the left of each item is a blank. Select the most appropriate response and write its number in the blank.

Example: 1 Sex: 1. Male

2. Female (The "1" in the blank indicates the respondent is a male.)

- ____ 1. Age: 1. 18-23 3. 30-35 5. 42-47 7. 54-58 9. Over 64
2. 24-29 4. 36-41 6. 48-53 8. 59-64
- ____ 2. Sex: 1. Male 2. Female
- ____ 3. Education: 1. Less than 8 5. 11 9. 3 years college 12. Master's Degree
(number of years) 2. 8 6. 12 10. 4 years college 13. Beyond Master's
3. 9 7. 1 year college 11. more than 4 but but no Ph.D.
4. 10 8. 2 years college no advanced degree 14. Ph.D.
- ____ 4. Years of service in 1. less than 1 3. 5-9 5. 15-19 7. 25 or more
present organization: 2. 1-4 4. 10-14 6. 20-24
- ____ 5. Your work in this 1. Part time (voluntary, unpaid) 3. Full time (temporary)
organization is: 2. Part time (paid) 4. Full time (permanent)
- ____ 6. Average salary in present organization:*
- ____ 7. Starting salary in present organization:*
- ____ 8. Approximately how many levels are below you in this organization (your organization is the name that is on your letterhead)?
- ____ 9. Approximately how many people work in your total company or organization?
- ____ 10. What is the primary function of your department/division/unit?
1. Production 6. Client service
2. Purchasing 7. General administration
3. Research & development 8. Finance/accounting
4. Sales, marketing, advertising, public relations 9. Personnel/training
5. Engineering design 10. Other (please specify) _____
- ____ 11. Approximately how many people work in the department/division/unit described in item 10?
- ____ 12. How many members, including the boss, are there in your work group (the group in which you and others at your level report to a common superior)?
- ____ 13. How many people report directly to you (i.e., on the level directly below you)?
1. None 3. 6-10 5. 16-20
2. 1-5 4. 11-15 6. more than 20
- ____ 14. During the past four years, how many changes in position within the organization have you had:
____ promotions to a higher level?
____ lateral transfers (at the same level)?
____ demotions (to a lower level)?

*Optional. Leave blank if you do not wish to answer.

It should be mentioned that the scales which have been developed for use in this research are treated as interval level scales. The debate as to whether such scales should be treated as interval has not been resolved in the literature (e.g. Rozenboom, 1966; Nunnally, 1967). Rigorous assessment (Kmenta, 1971) shows that all desirable properties of estimators -- unbiasedness, linear efficiency, asymptotic unbiasedness, consistency, and asymptotic efficiency -- are lost when the assumption of interval measurement is violated when using correlation, regression, and path analysis. However, many have argued that the degree of distortion is small in most circumstances (cf., Bohrnstedt and Carter, 1971; Wilson, 1974; Lyons and Carter, 1971; Hawkes, 1971). These arguments rest on a number of studies utilizing simulated data. Labovitz (1967; 1970) comes to the conclusion that as long as one assumes (correctly) a monotonic relationship between the ordinal measuring scale and the underlying true scale, parametric estimates will yield few aberrations. By monotonic it is meant that if a respondent scores, say, 4 on an ordinal scale which corresponds to "strongly disagree", the intensity of his feeling may not be equal to another who receives the same score, but it is certainly greater than a respondent who scores 3 on that scale. In a sense, though, these conclusions merely shift the focus of the debate. One must still ascertain whether the scales are monotonic and the degree to which the estimators are inaccurate. The monotonic assumption cannot be practically assessed in most research situation. In addition, Grether (1976), while duplicating the Labovitz experiments, concluded that by "slightly" changing the measuring scales, the magnitude and sign of the regression estimates could be changed. In light of these developments, one must conclude that the state-of-the-art in ordinal parametric estimation offers no definitive answer. The only conclusion forthcoming is that the better the ordinal scale, the more accurate the regression estimates. Re-

searchers must balance the explanatory power of parametric procedures such as regression and path analysis with the potential inaccuracies resulting from their use with ordinal measures. It is felt that the exploratory nature of this study (the concern with the general nature of the variable linkages rather than precise mathematical modeling) supports the inclusion of the communication model scales in the regressions and path analysis. The other assumptions necessary for correlation and regression analysis (Kmenta, 1971) are less crucial. It has been shown (Bohrnstedt and Carter, 1971) that regression and path analysis are robust in the face of heteroskedasticity, autoregression, and so on.

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ONR Branch Office
1030 E. Green St
Pasadena, CA 91106

Research Psychologist
ONR Branch Office
536S. Clark St.
Chicago, IL 60605

PRINCIPAL INVESTIGATORS

Dr. Earl A. Alluisi
Old Dominion University Res. Foundation
Norfolk, Virginia 23508

Dr. James A. Bayton
Department of Psychology
Howard University
Washington, DC 20001

Dr. H. Russell Bernard
Dept. of Sociology & Anthropology
West Virginia University
Morgantown, West Virginia 26506

Dr. Arthur Blaiwes
Naval Training Equipment Center
Orlando, Florida 32813

Dr. Milton R. Blood
School of Business
Georgia Institute of Technology
Atlanta, Georgia 30332

Dr. David G. Bowers
Institute of Social Research
University of Michigan
Ann Arbor, Michigan 48106

Dr. John J. Collins
Vice President
Essex Corporation
201 N. Fairfax St.
Alexandria, VA 22314

Dr. Faris Kirkland
University City Science Center
Center for Social Development
3624 Science Center
Philadelphia, Pennsylvania 19104

Dr. C. Brooklyn Derr
Associate Professor, Code 55
Naval Post Graduate School
Monterey, California 93940

Dr. Samuel L. Gaertner
Department of Psychology
University of Delaware
220 Wolf Hall
Newark, Delaware 19711

Dr. William E. Gaymon
Richard A. Gibboney Associates, Inc.
10605 Concord St.

Dr. Paul S. Goodman
Graduate School of Industrial Admin.
Carnegie-Mellon University
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Dr. J. Richard Hackman
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56 Hillhouse ave.
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Dr. Edwin Hollander
Department of Psychology
State University of New York
at Buffalo
4230 Ridge Lea Rd.
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Washington, DC 20380

Dr. A. L. Slafkosky
Code RD-1
HQ US Marine Corps
Washington, DC 20380

Coast Guard

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US Coast Guard (G-P-1/62)
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Washington, DC 20590

Navy

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Assistant for Research Liaison (Pers-Or)
Washington, DC 20370

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Human Resource Management
Washington, DC 20370

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Human Resource Management Financial Office
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Canadian Defense Liaison Staff,
Washington
2450 Massachusetts Ave., NW
Washington, DC 20008

Dr. Lennart Levi, Director
Lab, for Clinical Stress Research, Fack
S-104 01 Stockholm, Sweden

Mr. Luigi Petrullo
2431 N. Edgewood St.
Arlington, VA 22207

Commanding Officer
1 Psychological Research Unit
Chancery House
485 Bourke St.
Melbourne vic 3000
Australia

Head, Research & Analysis Branch
Navy Recruiting Command (Code 434)
4015 Wilson Blvd.
Arlington, VA 20795

Dr. Meredith Crawford
5605 Montgomery St.
Chevy Chase, MD 20015

CDR Donald F. Parker, USN
Management Department
U. S. Naval War College
Newport, RI 02840

Dr. Diane C. Ryan
McBer and Company
137 Newbury St.
Boston, MA 02116

Dr. William S. Maynard
Department of Leadership & Law
U. S. Naval Academy
Annapolis, MD 21402

Dr. Nyron M. Zajkowski
Director Training Analysis and Evaluation
Group
Orlando, FL 32813

Professor John Senger
Operations Research & Administration
Sciences
Naval Postgraduate School
Monterey, CA 93940

CDR Robert S. Kennedy
Head, Human Factors Engineering Branch
(1242)
USN Pacific Missile Center
Pt. Mugu, CA 93042

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San Diego, CA 92133 NTC

Scientific Director
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San Diego, CA 92152

Navy Personnel R&D Center
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Washington, DC 20370

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NAS Memphis (75)
Millington, TN 38054
ATTN: Mr. Tom Warrick, N622

Dr. C. Brooklyn Derr
Associate Professor, Code 55
Naval Postgraduate School
Monterey, CA 93940

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5621-23 Tidewater Drive
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